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HOSPITAL AND TRAINING SCHOOL ADMINISTRATION

IN CHARGE OF

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Anyone, nurse, mother or other, who has charge of the preparation of milk modifications will contribute greatly to her own convenience by assembling the directions in the following article in the form of recipes to be either carried about with her or framed and hung on the wall in the vicinity of the work table where the modifications are made. Portions of this article were published in the *Modern Hospital* three years ago.

PREPARATION OF MILK MODIFICATIONS

By Henry F. Keever, M.D.
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In order to understand why we must dilute cow's milk before feeding it to infants, we must compare the relative constituents of human milk and cow's milk. Milk is made up of fats, sugar, proteid, water, and salts. For our purpose we can disregard the last two elements and compare the first three, fats, sugar, and proteid. Human milk contains 4 per cent fat, 7 per cent sugar, and 1.50 per cent of proteid. Cow's milk contains 4 per cent fat, 4.50 per cent sugar and 3.20 per cent proteid. Comparing these, element for element, we find that the percentage of fat is the same. The fats in cow's milk are, however, more volatile than in human milk and therefore less easily assimilated. Human milk contains 2.50 per cent more sugar (lactose) than cow's milk. The greatest difference is in the proteid, and here we find a marked quantitative and qualitative difference. Human milk contains 1.50 per cent proteid; cow's milk, 3.20 per cent proteid. This quantitative difference is still further marked by the fact that human proteid consists of $\frac{1}{3}$ casein and $\frac{2}{3}$ whey, while cow's proteid consists of $\frac{3}{4}$ casein and $\frac{1}{4}$ whey. As the whey is the easily digested part of the proteid, it is readily seen that the proteid content of human milk is far more easily assimilated than the proteid of cow's milk.

The usual milk modification is made of cream, skim milk, water, or barley water as a diluent, and milk sugar. Creams vary according to the percentage of fat they contain. Gravity cream, that is, the top of the bottle to the cream line, usually the top six ounces in a quart bottle, contains 16 per cent fat. Centrifugal cream contains 32 per cent fat. It is important for the nurse to know the percentage of cream to be used, and this is usually stated by the doctor. There are three methods of obtaining cream: (1) Pouring off the top, 4, 6, or 8 ounces; (2) dipping; (3) siphonage.

Of these three, probably the latter is the more accurate, though the first is the simplest. It is well to remember that after a quart of milk has stood four hours, the top 4 ounces contains 20 per cent fat; the top 6 ounces, 16 per cent fat; the top 8 ounces, 12 per cent fat; and the top 11 ounces, 10 per cent fat.

The bottom 8 ounces of the jar equals fat free milk (skim milk).

In siphoning milk:

The first ℥ VIII drawn	equals fat free milk
The next ℥ XIII drawn	equals middle milk
The last ℥ XI drawn	equals 10 per cent cream
The last ℥ VIII drawn	equals 12 per cent cream
The last ℥ VI drawn	equals 16 per cent cream
The last ℥ IV drawn	equals 20 per cent cream

If more cream is needed than can be drawn from one bottle, the same quantity of the per cent required should be drawn from several bottles and thoroughly mixed before using.

Example. If ℥ XVIII of a 10 per cent cream is required, syphon ℥ XI of 10 per cent cream from each of two quart bottles. Mix the two creams and take ℥ XVIII of the mixture.

In the preparation of the formula, the water should be boiled and cooled before adding to the milk. If boiling water is added to milk, it scalds it and ultimately tends to produce scorbutus. All solutions must also be cooled before adding to the milk.

The milk sugar should be put in solution in about 2 ounces of boiling water, as it is much more soluble in hot water. After the formula has been prepared, it should be placed in the separate feeding bottles, stoppered with cotton plugs, and put on ice. The nipples should be kept in a saturated solution of boric acid and boiled once a day.

One of the most commonly used diluents in the preparation of formulas is barley water. It is made as follows: 1 ounce barley flour to 1 quart of water. Boil twenty minutes in a double boiler, strain, add enough water to make a quart. This makes a 1.50 per cent solution. The advantages of barley water are:

1. It helps to break up the casein curds in the stomach.

2. It adds to the food value of the mixture. Babies ordinarily do not possess the ability to digest starch until the fifth or sixth month.

Whey is one of the most easily digested milk products, and often is assimilated easily when other foods cannot be tolerated. Its food value is relatively low, containing no fat, 5 per cent sugar, and 0.9 per cent of proteid.

Whey is sometimes made with junket tablets as follows: After the milk has set with junket tablets according to directions on package, break up with a fork and strain three times through linen. What goes through is whey. Then heat whey to 158° to prevent curdling.

In making whey-cream mixtures the whey must be heated to 155°F. and then cooled before adding the cream. Heating the whey destroys the rennin ferment.

Whey is made by adding 4 teaspoons liquid rennet (essence of pepsin) to 1 quart skim milk; heat to 105°F.; let stand until the curd forms; break up the curd with a fork and strain several times through a napkin; heat to 155°F. to destroy the enzymes. If this is not done, and cream is added to the whey, the cream will curdle. One quart of skim milk will make about 24 ounces of whey.

Albumen water is sometimes used as a diluent and is made as follows: Water, 4 ounces, (104°F.), added to white of one egg, stir with a knife and strain.

Lime water is added to milk modifications to delay stomach digestion, causing most of the food to be digested in the intestines. In certain cases, rendering the stomach reaction alkaline lessens the vomiting, gas, and colic.

In those cases where it is considered desirable to pasteurize the milk, it may be done as follows: Heat to 140°F.; hold at this temperature for twenty minutes; place on ice. Pasteurization at this temperature kills the pathogenic bacteria, but does not destroy the enzymes, which are needed for digestion.

To peptonize the baby's milk use one tube of peptonizing powder (Fairchilds) dissolved in 8 ounces of warm water. Put 1 dram in each of eight feedings, ten minutes before feeding, and heat to 105° for ten minutes. Use at once. Prolonged heating tends to make the milk bitter.

If it is desired to sterilize the milk, it may be done by bringing it to the boiling point, 212°F., and holding there for five minutes. This process kills certain enzymes which are essential for complete assimilation.

The most common sources of error in making up milk formulas are the following:

1. Contaminated milk. This is especially dangerous in hot weather. All milk for infant feeding should come from tuberculin tested cows in inspected dairies. Absolute cleanliness in respect to hands, utensils, bottles, etc., must be observed in handling the milk.

2. Errors in the fat percentage of cream. One must be sure that the percentage of fat in the cream used is the one that is required. A common error is the belief that the richer the cream the better for the baby.

3. Errors in the fat percentage of milk. All the foregoing figures are based on a 4 per cent fat in whole milk.

Successful feeding of a baby is largely dependent on the nurse. A baby should be fed slowly, twenty minutes to a feeding. It should be fed regularly, at definite intervals, and, if on the bottle, stated amounts. The bottle should always be held, not propped against a towel and the infant left to its own resources. The milk should be heated to 100°F., and should fill the neck of the bottle, so that the infant will not get a mixture of milk and air.

THE FLY IS THE TIE THAT BINDS THE UNHEALTHY TO THE HEALTHY!

The fly has no equal as a germ "carrier;" as many as five hundred million germs have been found in and on the body of a single fly.

It is definitely known that the fly is the "carrier" of the germs of typhoid fever; it is widely believed that it is also the "carrier" of other diseases, including possibly infantile paralysis.

The very presence of a fly is a signal and notification that a housekeeper is uncleanly and inefficient.

Do not wait until the insects begin to pester; anticipate the annoyance.

April, May and June are the best months to conduct an anti-fly campaign.

The farming and suburban districts provide ideal breeding places, and the new born flies do not remain at their birth place but migrate, using railroads and other means of transportation, to towns and cities.

Kill flies and save lives!—*Special Bulletin, The Merchants' Association of New York.*